

## 5

A semiconductor structure for providing cross-point switch functionality includes a monocrystalline silicon substrate, and an amorphous oxide material overlying the monocrystalline silicon substrate. A monocrystalline perovskite oxide material overlies the amorphous oxide material, and a monocrystalline compound semiconductor material overlies the monocrystalline perovskite oxide material. The monocrystalline compound semiconductor material includes an optical source component operable to generate a radiant energy transmission. A diffraction grating is optically coupled with the optical source component and has a configuration for passing the radiant energy transmission in a predetermined radiant energy intensity pattern, forming a plurality of replications of the radiant energy transmission. The semiconductor structure further includes at least one optical switch component optically coupled to the diffraction grating, where each optical switch component corresponds to at least one of the replicated radiant energy transmissions, and has a first state for passing the at least one replicated radiant energy transmission, and a second state prohibiting passage of the at least one replicated radiant energy transmission.